

FIG.1

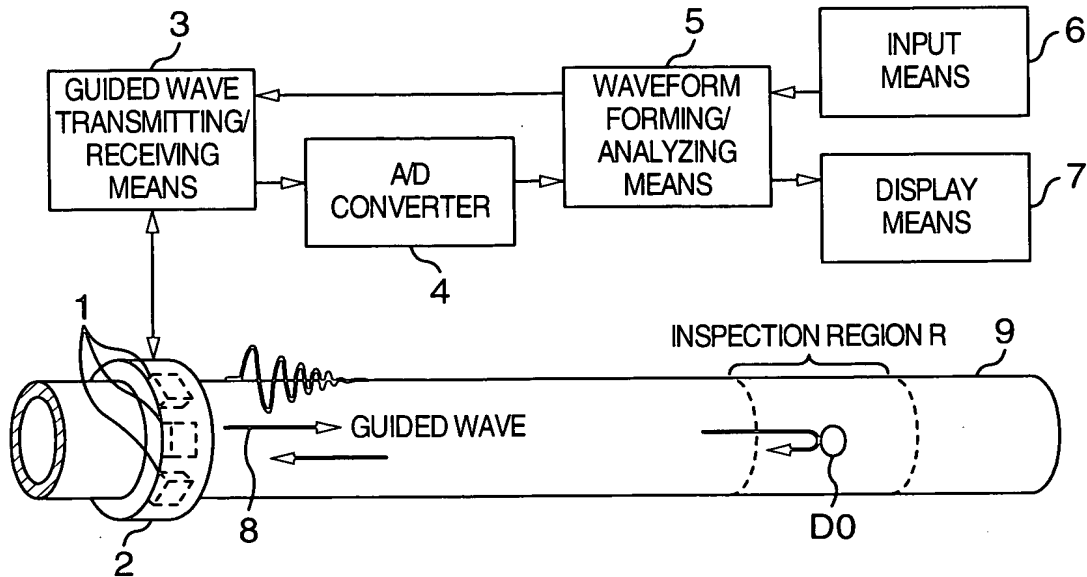


FIG.2

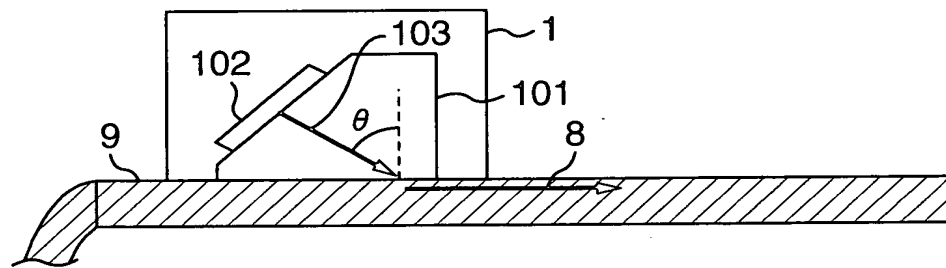


FIG.3

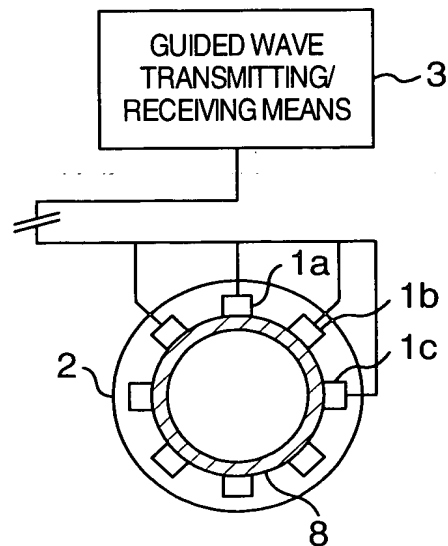


FIG.4A

INSPECTION CONDITION SETTING WINDOW	
PIPE WALL THICKNESS OF PIPE ARRANGEMENT	6 mm
MATERIAL	<input checked="" type="checkbox"/> CARBON STEEL <input type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> ALUMINUM
SOUND VELOCITY OF LONGITUDINAL WAVE	5940 m/s
SOUND VELOCITY OF SHEAR WAVE	3260 m/s
INSPECTION REGION (DISTANCE FROM ELEMENT)	500 mm ~ 1500 mm

FIG.4B

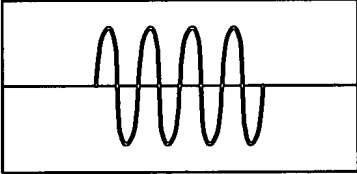
REFERENCE WAVEFORM SELECTING/DISPLAY WINDOW	
REFERENCE WAVEFORM	<input checked="" type="checkbox"/> TONE BURST WAVE <input type="checkbox"/> GAUSSIAN ENVELOPE <input type="checkbox"/> RECTANGULAR WAVE
CYCLE NUMBER	4
CENTER FREQUENCY	500 kHz
REFERENCE WAVEFORM PREVIEW 	

FIG.5

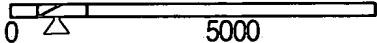
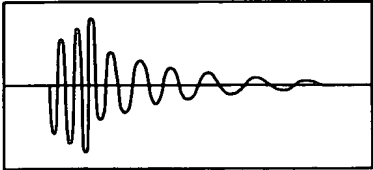
TRANSMISSION WAVEFORM DISPLAY WINDOW	
INSPECTION REGION	500 mm ~ 1500 mm
SEGMENT DIVISION	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
INSPECTION SEGMENT INDICATOR 	
SEGMENT CENTER 1000 mm	
TRANSMISSION WAVEFORM PREVIEW 	

FIG.6

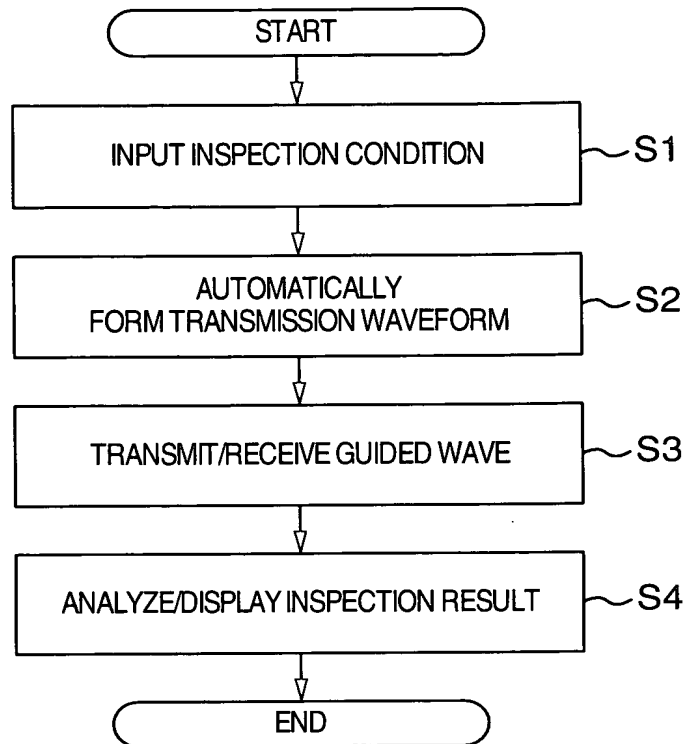


FIG.7A

REFERENCE WAVEFORM
 $u(t)$

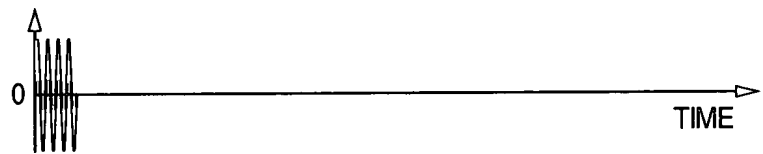


FIG.7B

CALCULATED WAVEFORM WHEN
 GUIDED WAVE OF REFERENCE
 WAVEFORM " $u(t)$ " TRANSMITTED AT
 $x=0$ IS REACHED TO POSITION OF $x=2d$
 $u(2d, t)$

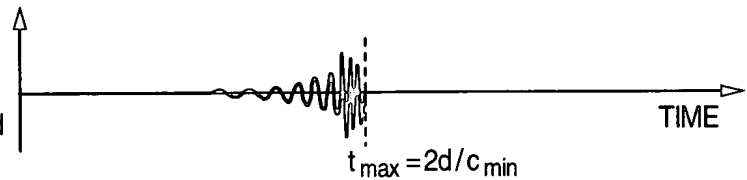


FIG.7C

TRANSMISSION WAVEFORM
 $u'(t) = u(2d, t_{\max} - t)$



FIG.7D

CALCULATED WAVEFORM WHEN
 GUIDED WAVE OF TRANSMISSION
 WAVE " $u'(t)$ " TRANSMITTED AT
 $x=0$ IS REACHED TO POSITION OF $x=2d$

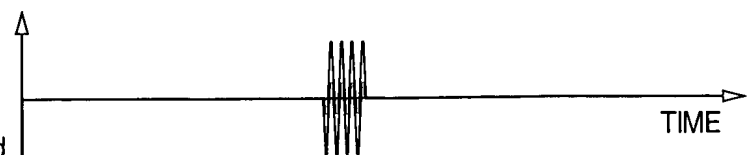


FIG.8

TRANSMISSION WAVEFORM AUTOMATICALLY FORMED UNDER INSPECTION REGION
FROM 500 mm TO 150 mm

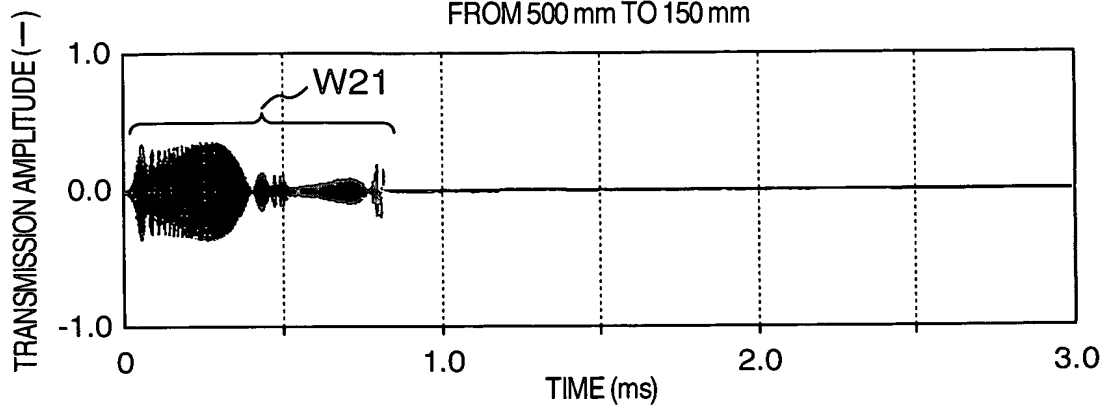


FIG.9A

INSPECTION RESULT USING NORMAL
TRANSMISSION WAVEFORM

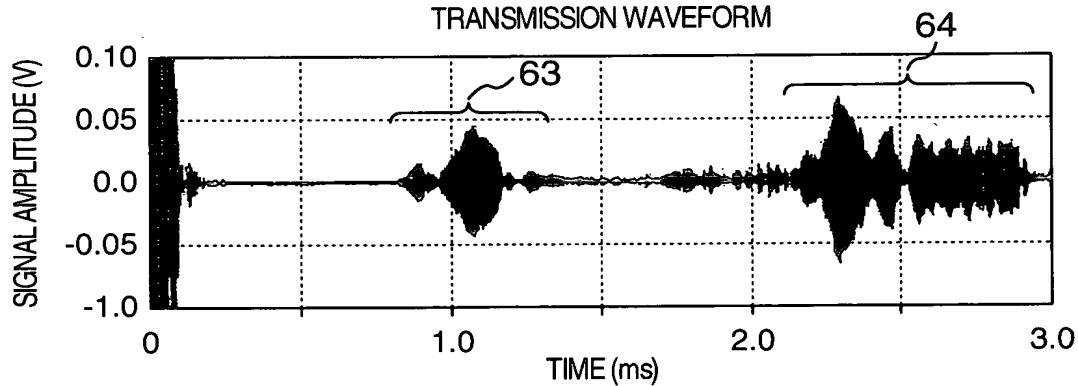


FIG.9B

INSPECTION RESULT USING AUTOMATICALLY FORMED
TRANSMISSION WAVEFORM

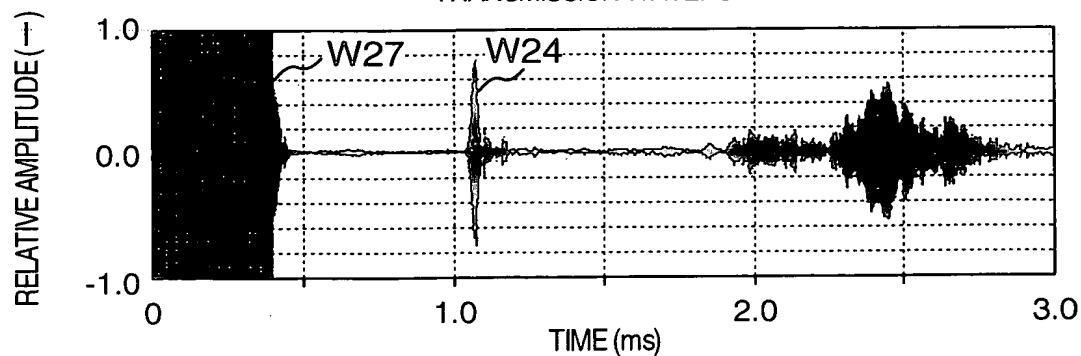


FIG.10A

TRANSMISSION WAVEFORM DISPLAY WINDOW	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>INSPECTION REGION</p> <div style="border: 1px dashed black; padding: 2px; margin-bottom: 5px;">1000 mm</div> <p style="text-align: center;">~</p> <div style="border: 1px dashed black; padding: 2px;">5000 mm</div> </div> <div style="width: 5%; text-align: center;">~</div> <div style="width: 45%;"> <p>SEGMENT DIVISION</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO </div> <p>SEGMENT NUMBER</p> <div style="border: 1px solid black; padding: 2px; text-align: center;">8</div> </div> </div> <div style="margin-top: 10px;"> <p>INSPECTION SEGMENT</p> <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center; justify-content: center;"> 1 ↕ </div> <div style="border: 1px dashed black; padding: 2px; margin-top: 5px;">1000 mm</div> <p style="text-align: center;">~</p> <div style="border: 1px dashed black; padding: 2px;">1500 mm</div> </div>	<p>INSPECTION SEGMENT INDICATOR</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <div style="display: flex; align-items: center;"> <div style="width: 10%; border-bottom: 1px solid black; margin-right: 5px;"></div> <div style="flex-grow: 1; border-bottom: 1px solid black; position: relative;"> <div style="position: absolute; left: 0; top: -5px;">0</div> <div style="position: absolute; right: 0; top: -5px;">5000</div> </div> </div> </div> <p>SEGMENT CENTER 1250 mm</p> <p style="text-align: center; margin-top: 10px;">TRANSMISSION WAVEFORM PREVIEW</p> <div style="border: 1px solid black; height: 100px; position: relative;"> <div style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></div> </div>

FIG.10B

TRANSMISSION WAVEFORM DISPLAY WINDOW													
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>INSPECTION REGION</p> <div style="border: 1px dashed black; padding: 2px; margin-bottom: 5px;">1000 mm</div> <p style="text-align: center;">~</p> <div style="border: 1px dashed black; padding: 2px;">5000 mm</div> </div> <div style="width: 5%; text-align: center;">~</div> <div style="width: 45%;"> <p>SEGMENT DIVISION</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO </div> </div> </div> <div style="margin-top: 10px;"> <p>INSPECTION SEGMENT</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>1</td><td>1000</td><td>1500</td></tr> <tr><td>2</td><td>1500</td><td>2000</td></tr> <tr><td>3</td><td>2000</td><td>2500</td></tr> <tr><td> </td><td> </td><td> </td></tr> </table> </div> <div style="margin-top: 10px;"> <p>INSPECTION SEGMENT</p> <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center; justify-content: center;"> 1 ↕ </div> </div>	1	1000	1500	2	1500	2000	3	2000	2500				<p>INSPECTION SEGMENT INDICATOR</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <div style="display: flex; align-items: center;"> <div style="width: 10%; border-bottom: 1px solid black; margin-right: 5px;"></div> <div style="flex-grow: 1; border-bottom: 1px solid black; position: relative;"> <div style="position: absolute; left: 0; top: -5px;">0</div> <div style="position: absolute; right: 0; top: -5px;">5000</div> </div> </div> </div> <p>SEGMENT CENTER 1250 mm</p> <p style="text-align: center; margin-top: 10px;">TRANSMISSION WAVEFORM PREVIEW</p> <div style="border: 1px solid black; height: 100px; position: relative;"> <div style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></div> </div>
1	1000	1500											
2	1500	2000											
3	2000	2500											

FIG.11

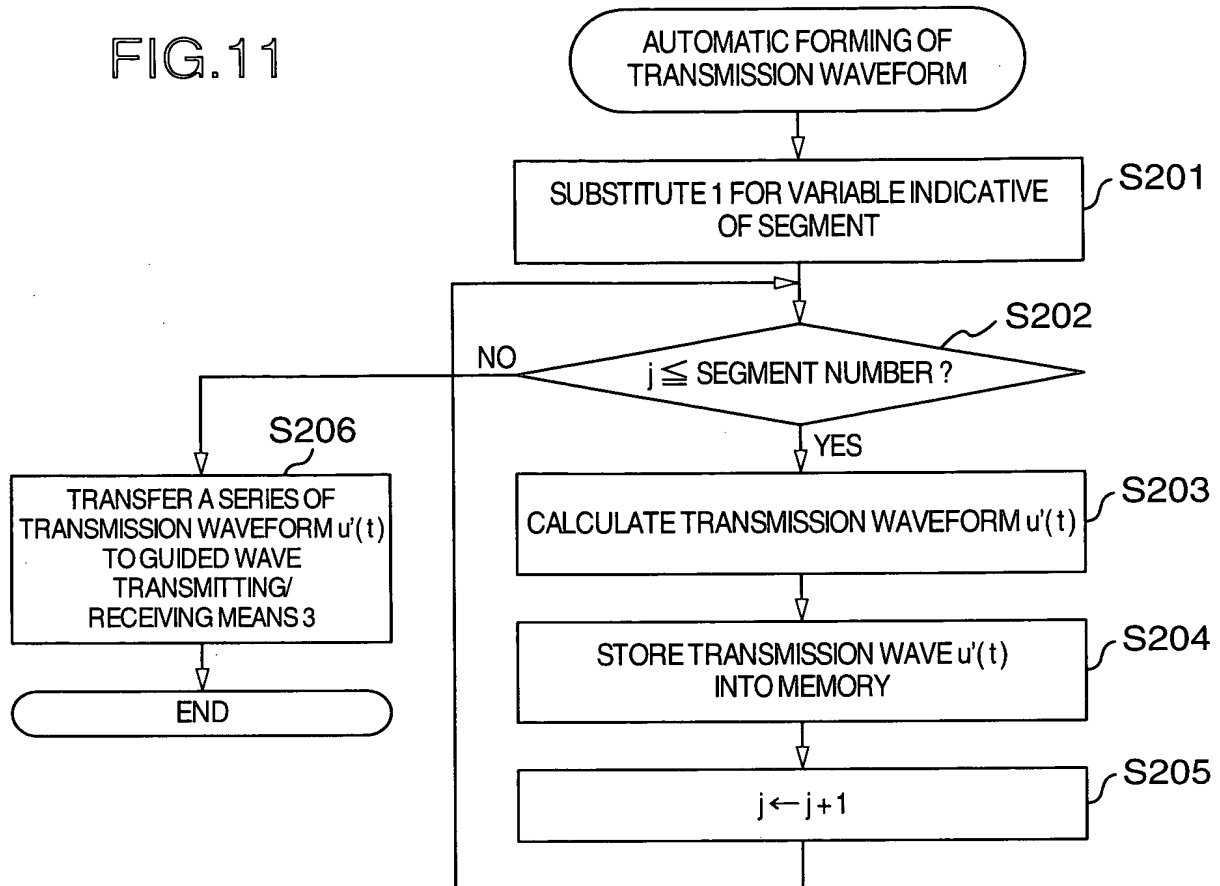


FIG.12

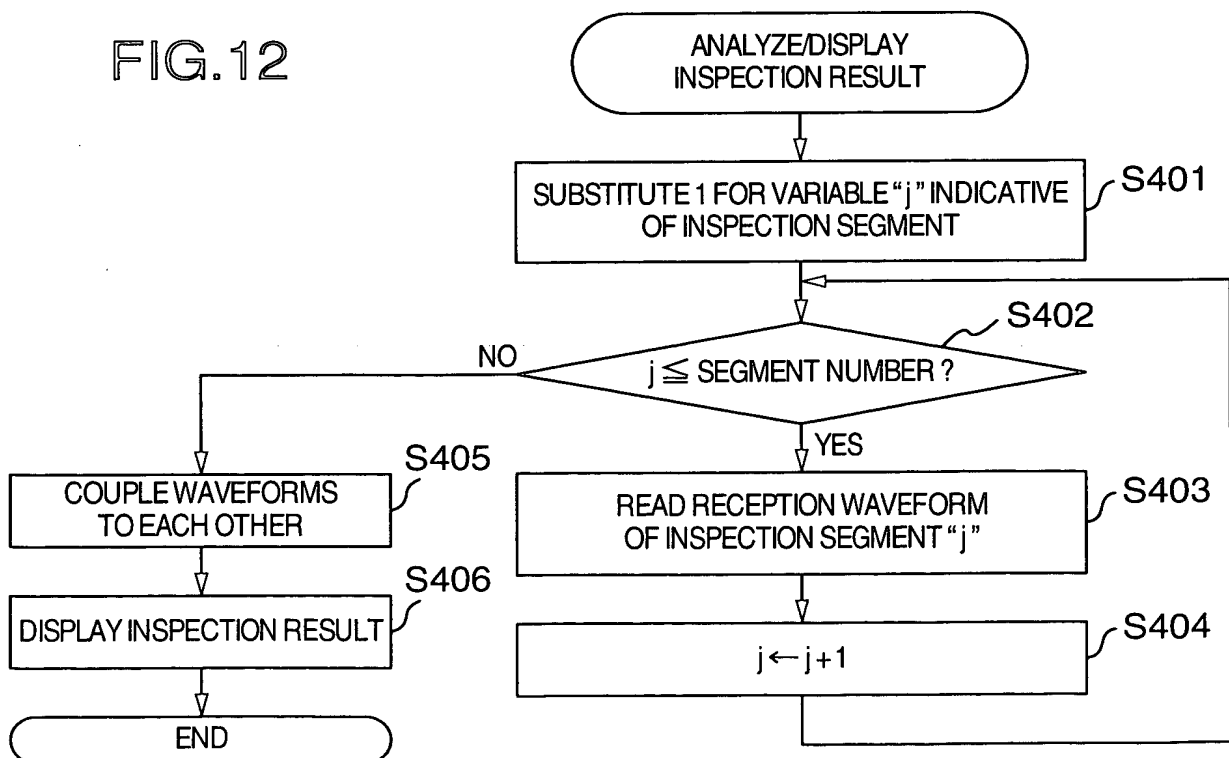


FIG.13A

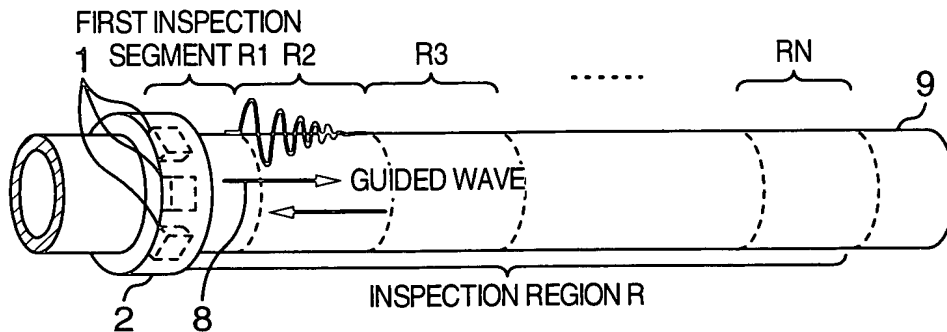


FIG.13B

RECEPTION WAVEFORM RECEIVED
 WHEN TRANSMISSION WAVEFORM
 HAVING HIGH SENSITIVITY WITH
 RESPECT TO SECOND INSPECTION
 SEGMENT (R2) IS APPLIED
 TO GUIDED WAVE TRANSMITTING/
 RECEIVING ELEMENT 1

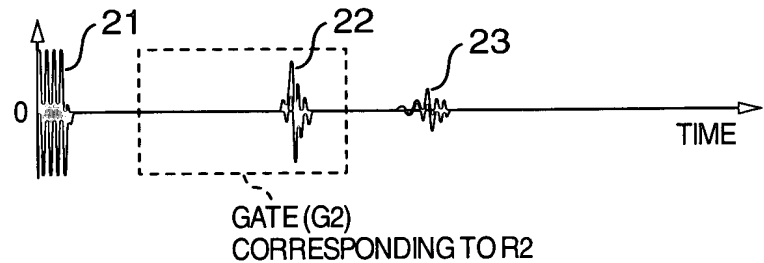


FIG.13C

RECEPTION WAVEFORM RECEIVED
 WHEN TRANSMISSION WAVEFORM
 HAVING HIGH SENSITIVITY WITH
 RESPECT TO THIRD INSPECTION
 SEGMENT (R3) IS APPLIED
 TO GUIDED WAVE TRANSMITTING/
 RECEIVING ELEMENT 1

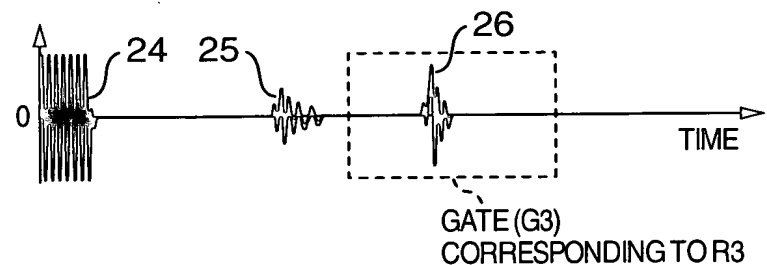


FIG.13D

COUPLED WAVEFORM

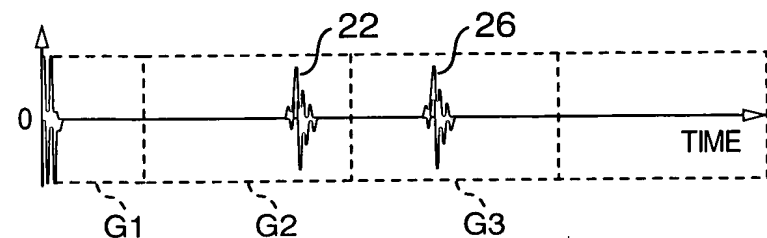


FIG.14A

TRANSMISSION WAVEFORM IN WHICH REFLECTION WAVE
FROM POSITION OF DISTANCE 500 mm BECOMES HIGH AMPLITUDE

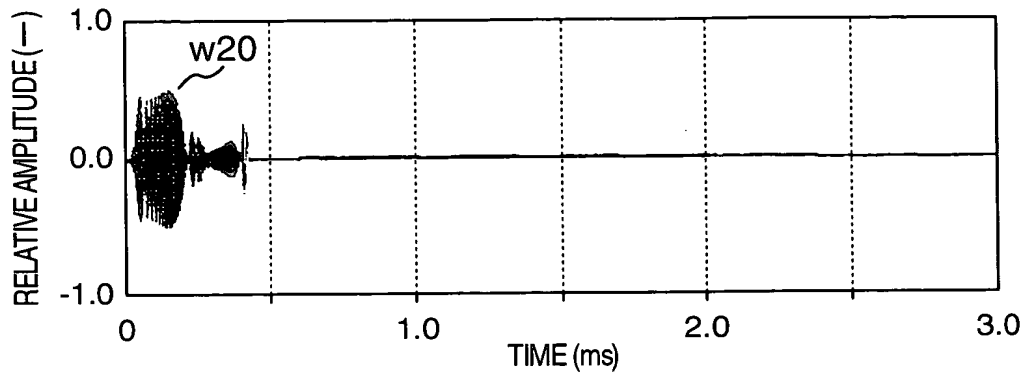


FIG.14B

TRANSMISSION WAVEFORM IN WHICH REFLECTION WAVE
FROM POSITION OF DISTANCE 1000 mm BECOMES HIGH AMPLITUDE

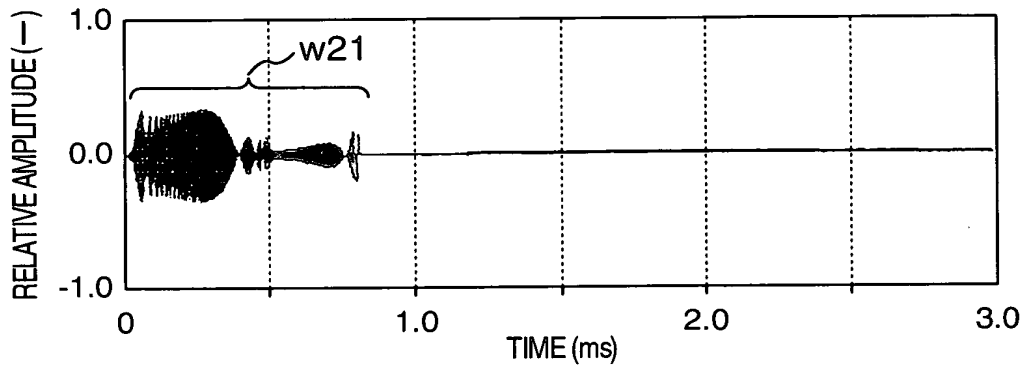


FIG.14C

TRANSMISSION WAVEFORM IN WHICH REFLECTION WAVE
FROM POSITION OF DISTANCE 2000 mm BECOMES HIGH AMPLITUDE

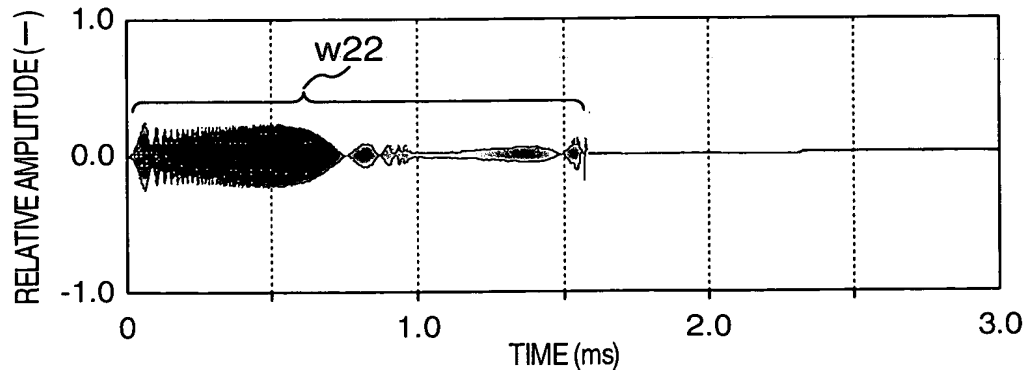


FIG.15A

REFLECTION WAVEFORM REFLECTED FROM DEFECT LOCATED AT POSITION
 BY DISTANCE 500 mm IN CASE THAT TRANSMISSION WAVEFORM IS TRANSMITTED IN WHICH
 REFLECTION WAVE REFLECTED FROM POSITION BY DISTANCE 500 mm BECOMES HIGH AMPLITUDE

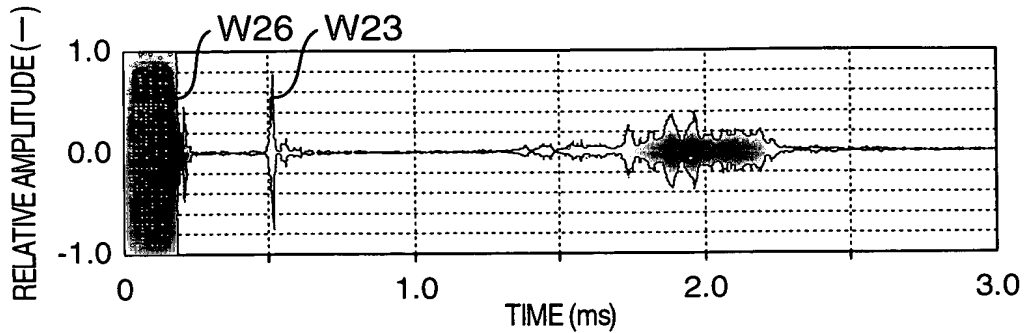


FIG.15B

REFLECTION WAVEFORM REFLECTED FROM DEFECT LOCATED AT POSITION
 BY DISTANCE 1000 mm IN CASE THAT TRANSMISSION WAVEFORM IS TRANSMITTED IN WHICH
 REFLECTION WAVE REFLECTED FROM POSITION BY DISTANCE 1000 mm BECOMES HIGH AMPLITUDE

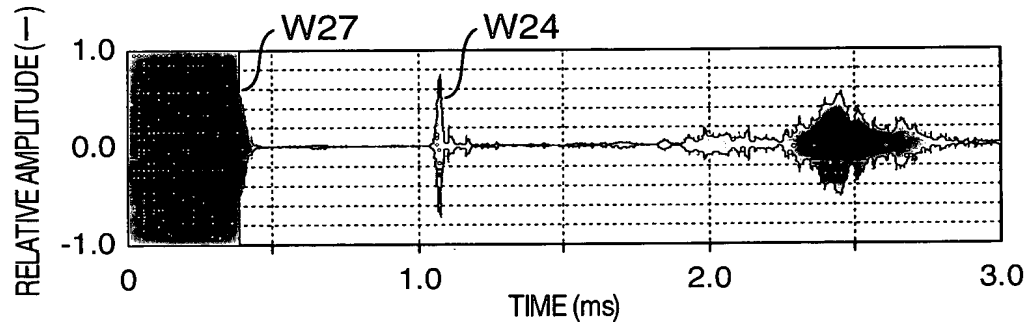


FIG.15C

REFLECTION WAVEFORM REFLECTED FROM DEFECT LOCATED AT POSITION
 BY DISTANCE 2000 mm IN CASE THAT TRANSMISSION WAVEFORM IS TRANSMITTED IN WHICH
 REFLECTION WAVE REFLECTED FROM POSITION BY DISTANCE 2000 mm BECOMES HIGH AMPLITUDE

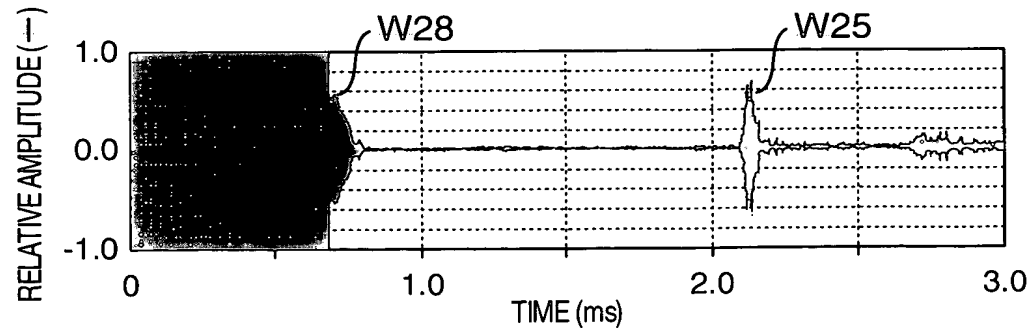


FIG.16

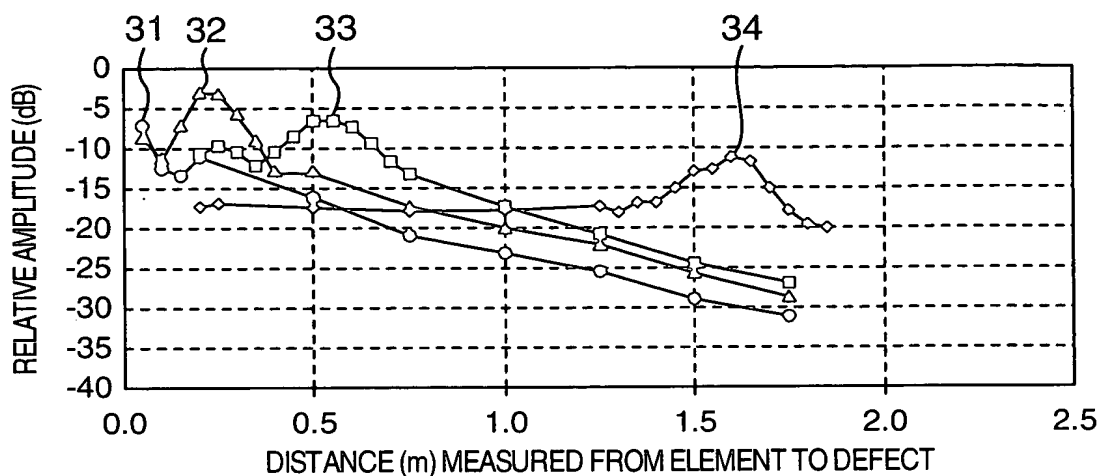


FIG.17A

DISPERSION AMPLITUDE
CORRECTION CURVE

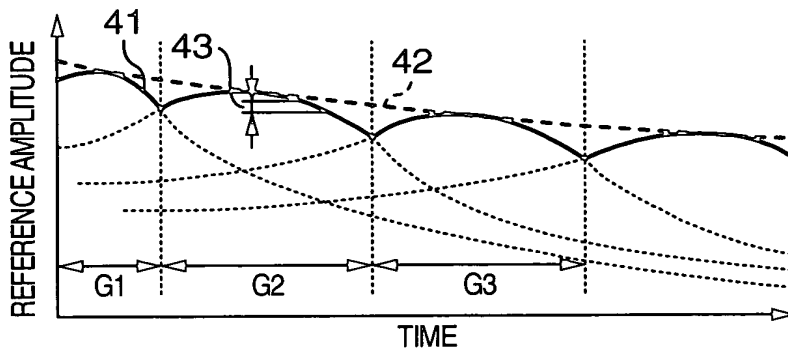


FIG.17B

COUPLED WAVEFORM

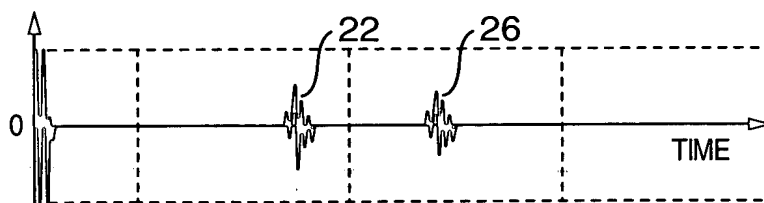


FIG.17C

COUPLED WAVEFORM AFTER
DISPERSION AMPLITUDE
CORRECTION

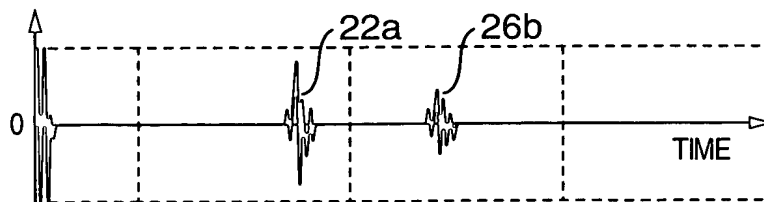


FIG.18

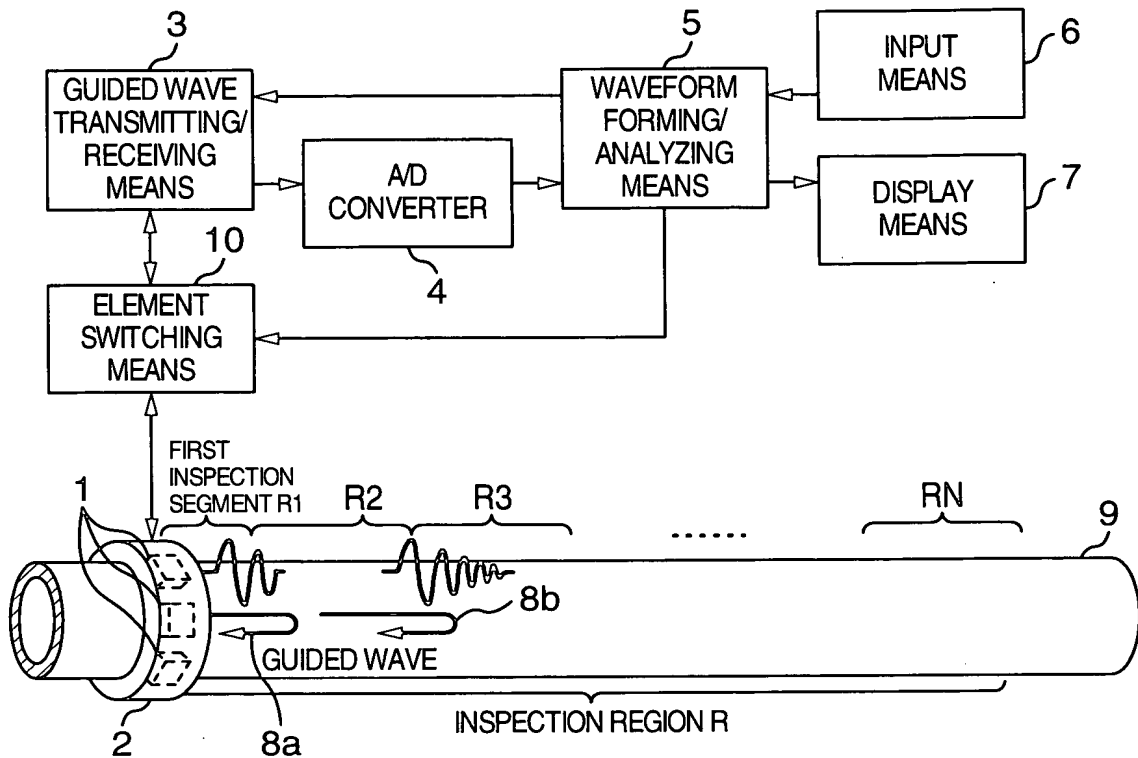


FIG.19

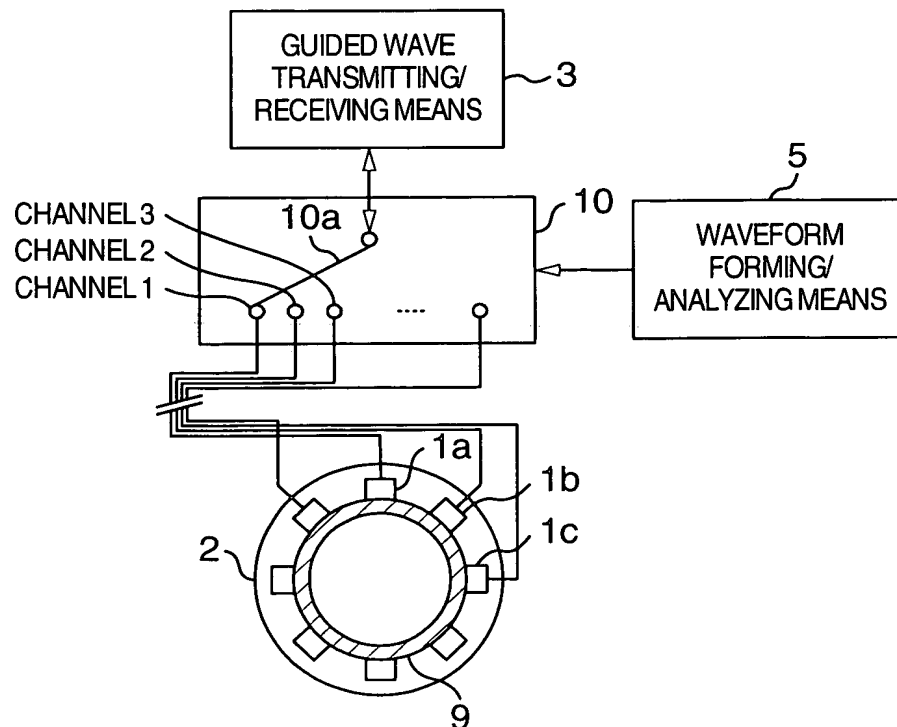


FIG.20

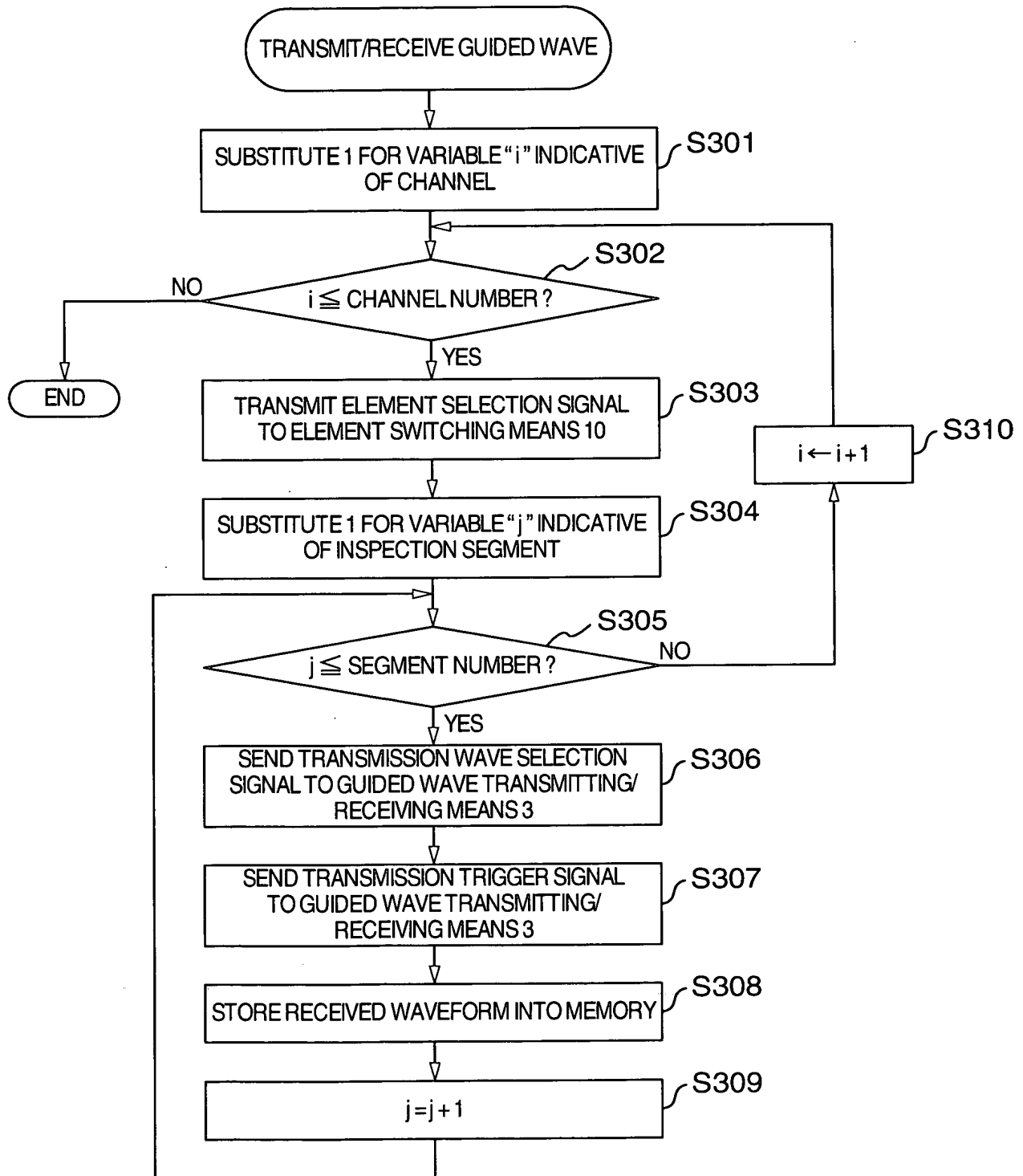


FIG.21

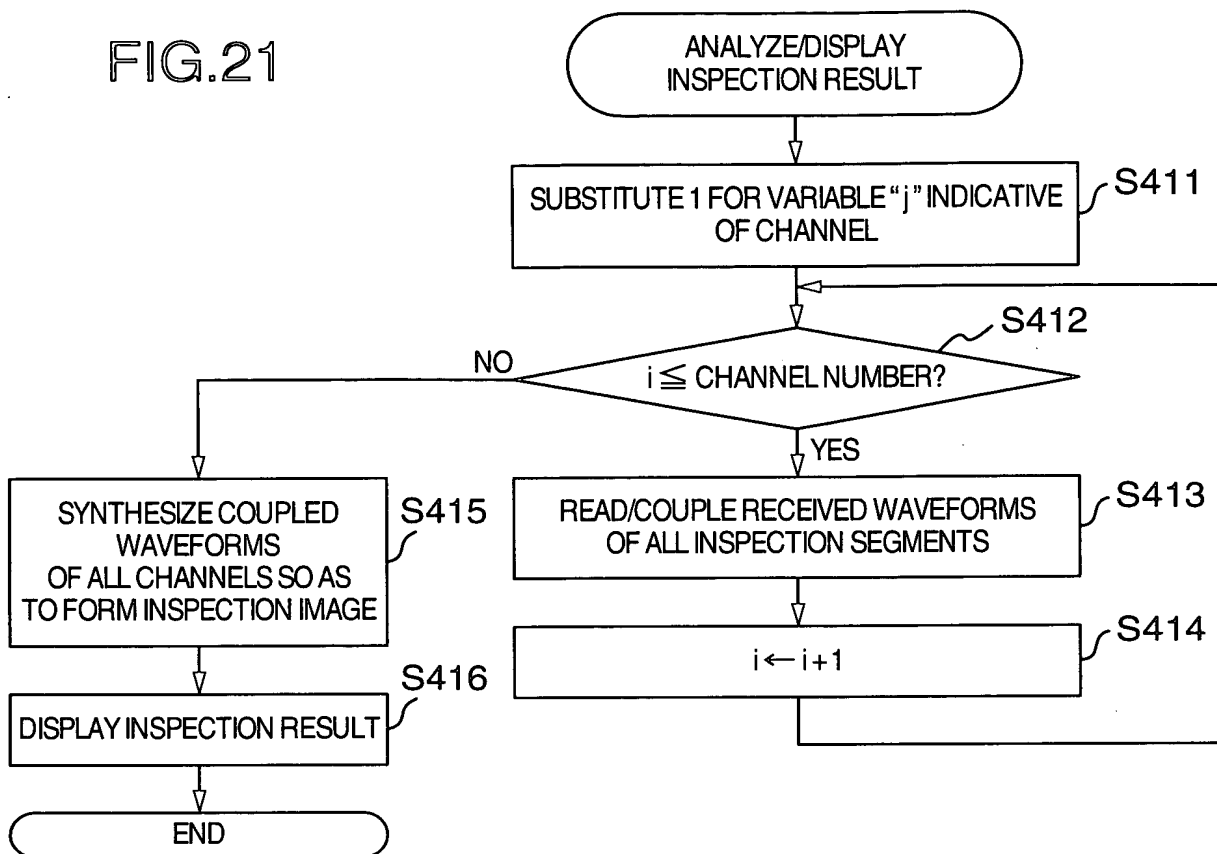


FIG.22A

COUPLED WAVEFORM
OF CHANNEL 1

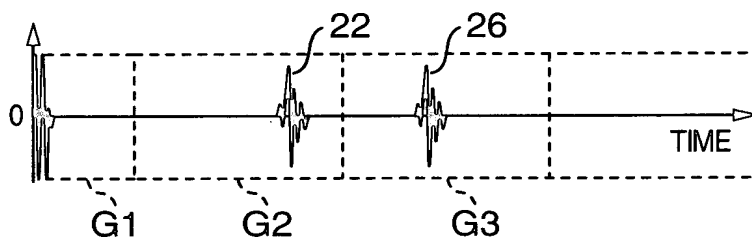


FIG.22B

INSPECTION IMAGE OBTAINED
BY SYNTHESIZING
COUPLED WAVEFORMS
OF ALL CHANNELS

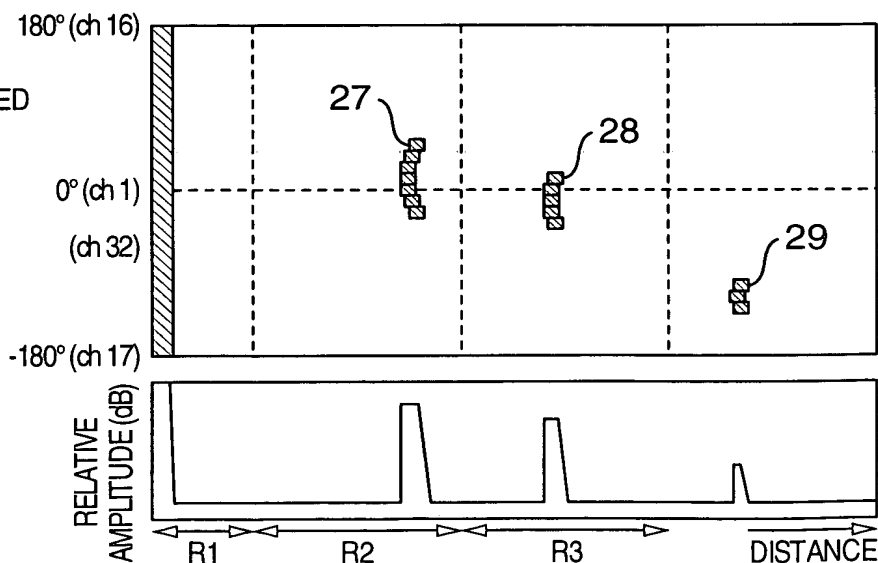


FIG.23A

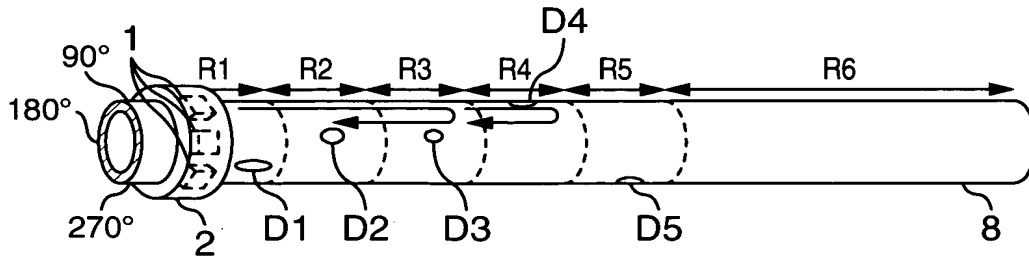


FIG.23B

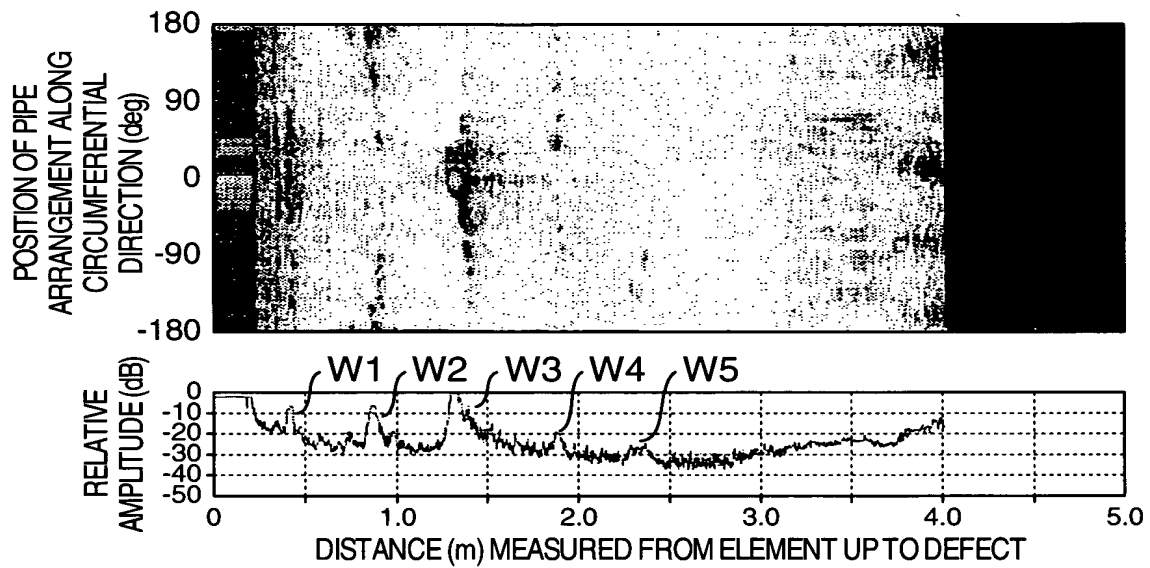


FIG.24

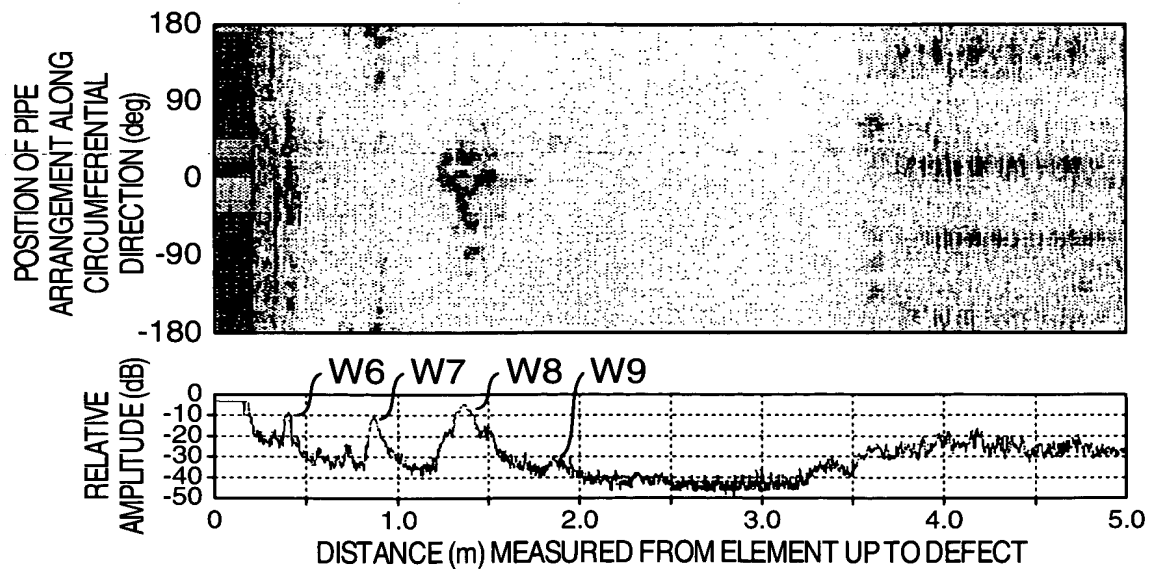


FIG.25

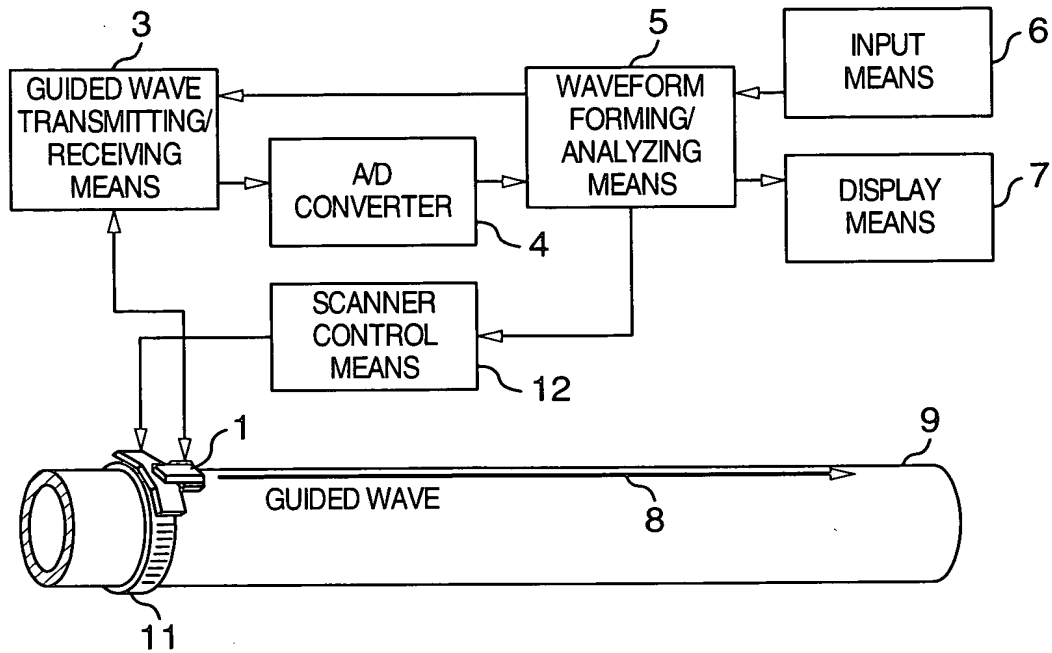


FIG.26

TONE BURST WAVE (EXAMPLE OF 4 CYCLES)

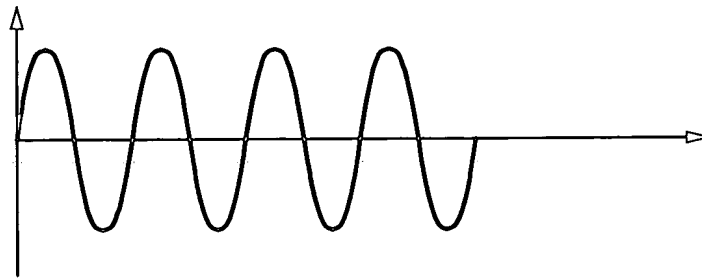


FIG.27A

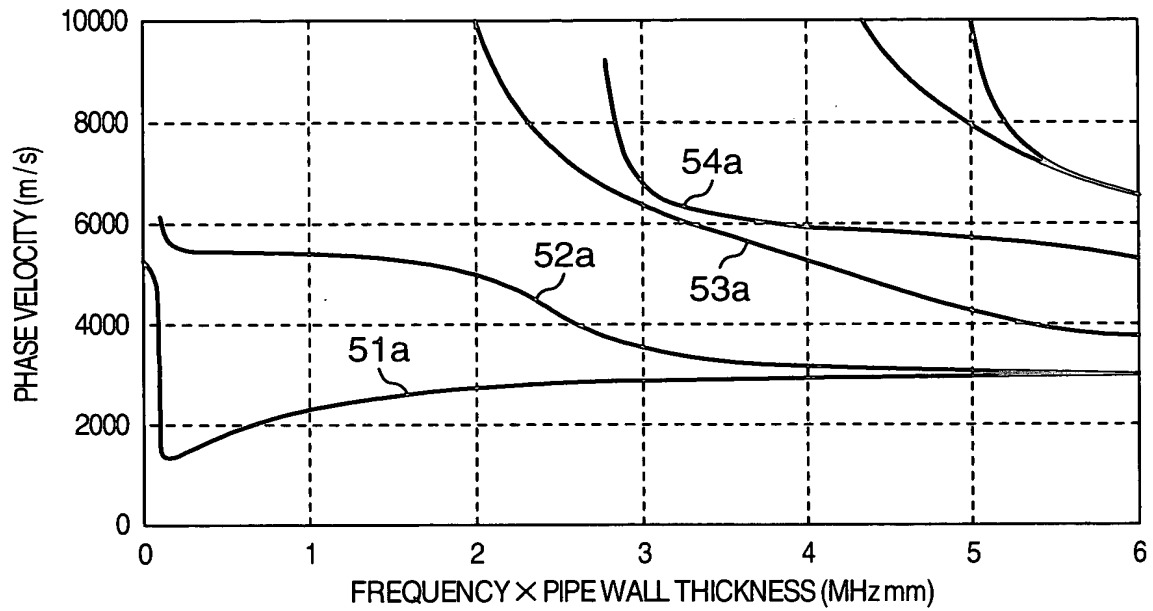


FIG.27B

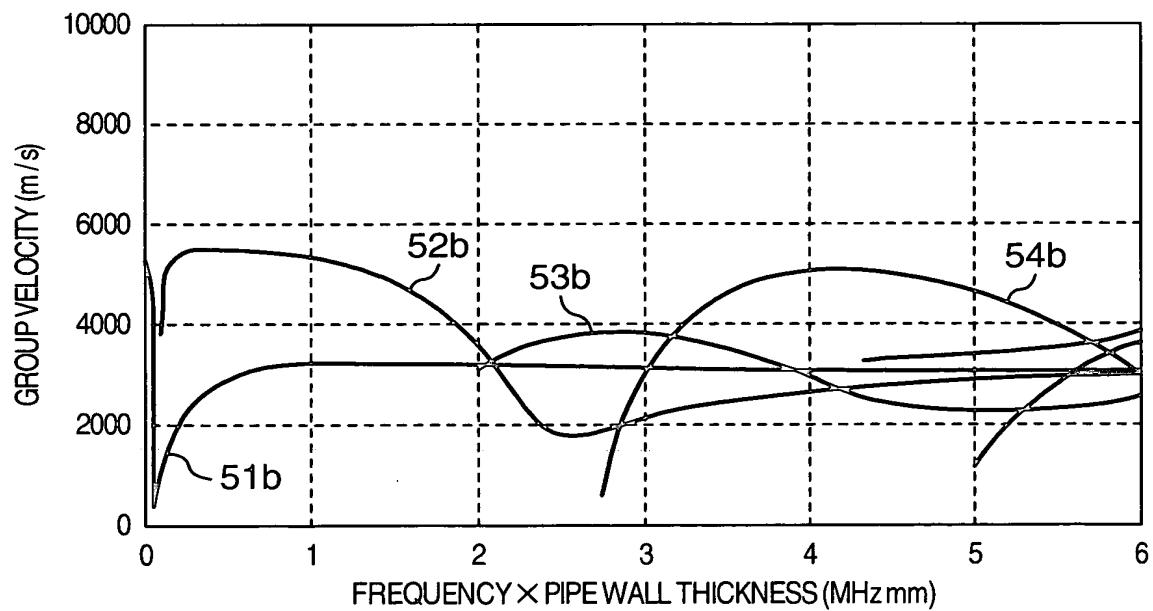
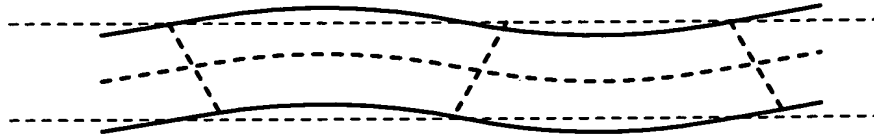
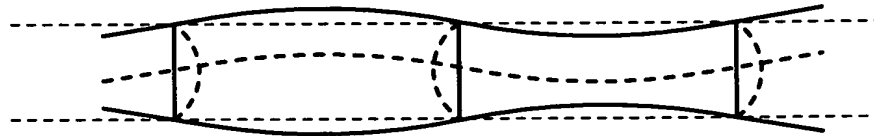


FIG.28

L (0,1) MODE



L (0,2) MODE



L (0,3) MODE

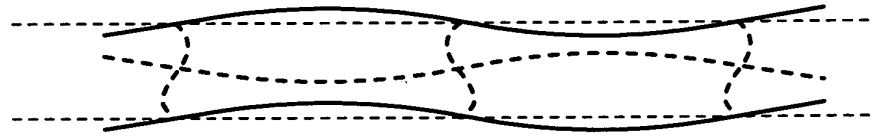


FIG.29A

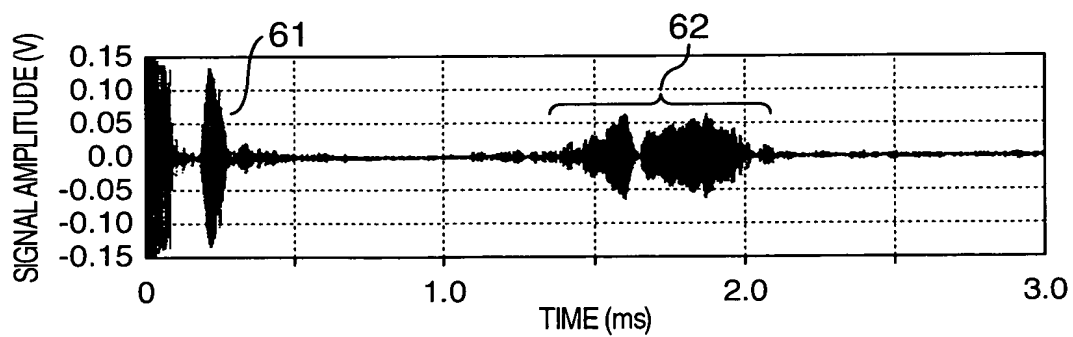


FIG.29B

